US-PAT-NO: 6176941

DOCUMENT-IDENTIFIER: US 6176941 B1

TITLE: Method of removing contaminants from an epidermal surface using an oscillating fluidic spray

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Known art sweeping jet fluidic oscillators 3,4 are typified by the fluidic windshield washer spray nozzle shown in FIG. 3 which is exemplary of the Bray device (U.S. Pat. No. 4,463,904 incorporated herein by reference thereto). The oscillator 11 is comprised of a contracting nozzle 12 which accelerates the liquid to form a jet 13. Reduced pressure in the vicinity of the containing walls 14 preferentially attracts the jet 13 to one side or the other depending on the random occurrence of some small disturbances or turbulent eddies at the side of jet 13. The jet then is attracted to one wall by the well-known **Coanda** Effect. Once the jet is deflected to one side or the other flow will preferentially be fed into the feedback passage 15 and will traverse the passage in a time in accordance with the inertance of the feedback passage. This time combined with the time it takes for a fluid element to traverse the distance from the nozzle 12 to the inlet to the feedback passage 16 constitutes one-half of the oscillation period. That is, when the fluid interacts with the jet at the control nozzle 17 it will deflect the jet to the opposite side, thereby starting the second half of the oscillation cycle. The jet is turned by the wall 18 downstream of the inlet to the feedback passage and directed

through an outlet nozzle or orifice and at the same time keeps the interior of the oscillator constantly filled with liquid, not allowing air to enter which would cause undesirable sputtering. These prior art feedback-type oscillators tend to have a non-uniform spray pattern in that the jet tends to dwell at the extremes of its deflection. The frequency of these devices can be modified by changing the overall dimensions and by altering the length and cross-sectional area of the feedback passage. Typical nozzle width dimensions of one of these oscillators is given by Bray to be 0.057-in and results in an oscillation frequency of several hundred hertz at pressures of 60 psi. To reduce the frequency by a factor of 10 would require increasing the dimensions ten-fold to an unacceptable size of over one-half inch. This is unacceptable because of the huge flow consumption that would occur as well as the unwieldy overall size of 6-8 inches. Size may be reduced by significantly increasing the feedback passage length, but since the primary feedback time is governed by the speed of sound, the length that would provide an appreciable increase in the oscillator time constant would be unacceptably long.